10th Class 2016

Chemistry	Group-II	Paper-II
Time: 2.45 Hours	(Subjective Type)	Marks: 63

(Part-I)

2. Write short answers to any Five (5) questions: 10

(i) Write uses of atmospheric gases in the manufacture of chemicals.

Ans The atmospheric gases are being used to manufacture chemicals since the advent of 20th century. Nitrogen is used to prepare ammonia, which is further used to manufacture nitrogenous fertilizers. Oxygen is used to prepare sulphur dioxide which is further used to manufacture king of chemicals sulphuric acid.

(ii) What are irreversible reactions? Give a few characteristics of them.

Ans The reactions, in which the product does not combine to form reactants are called irreversible reactions. A few characteristics of them are:

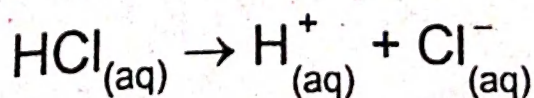
1. These reactions are proceed to completion.
2. No sign of equilibrium state occurs in these reactions.
3. These reactions may be conducted in open and close vessels.

(iii) Write uses of sulphuric acid.

Ans Sulphuric acid is used to manufacture fertilizers, ammonium sulphate, calcium superphosphate, explosives, paints, dyes, drugs. It is also used as an electrolyte in lead storage batteries.

(iv) A solution of HCl is 0.01 M. What is its pH value?

Ans Hydrochloric acid (HCl) is a strong acid so it ionizes completely. That is:

$$HCl_{(aq)} \rightarrow H^+_{(aq)} + Cl^-_{(aq)}$$

So, its solution also contains 0.01 M H^+ ions, *i.e.*, 10^{-2} M.

$$pH = -\log [H^+]$$

By putting the values of H^+ ions in the above equation,

$$pH = -\log 10^{-2}$$

$$pH = 2$$

(v) Write uses of $CaCl_2$.

Ans Calcium chloride ($CaCl_2$) is used for de-icing roads in winter, as a drying agent of chemical reagents and as freezing agent.

(vi) Write four sources of organic compounds. (Only names)

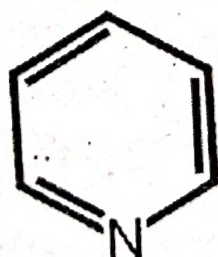
Ans 1. Proteins 2. Fats

2. Carbohydrates 4. Vitamins

(vii) Define functional group with an example.

Ans An atom or group of atoms or presence of double or triple bond, which determines the characteristic properties of an organic compound is known as the functional group. For example, –OH group is the functional group of alcohols.

(viii) What are heterocyclic compounds? Give example.

Ans Cyclic compounds that contain one or more atoms other than that of carbon atoms in their rings are called heterocyclic compounds. For example,

Pyridine

3. Write short answers to any Six (6) questions: 12

(i) State one important use of each:

(a) Chloroform (b) Carbon tetrachloride

Ans **(a) Chloroform:**

Chloroform is used as a solvent for rubber, waxes etc. and for anaesthesia.

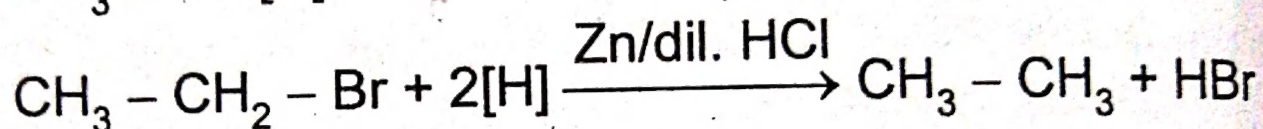
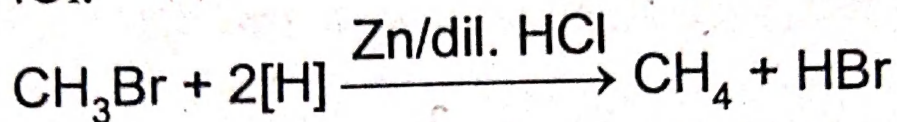
(b) Carbon tetrachloride:

Carbon tetrachloride is used as an industrial solvent and in dry cleaning.

(ii) How are alkyl halides reduced?

Ans Reduction means addition of nascent hydrogen. In fact, it is a replacement of a halogen atom with a hydrogen atom. This reaction takes place in the presence of metal and HCl.

$$CH_3Br + 2[H] \xrightarrow{\text{Zn/dil. HCl}} CH_4 + HBr$$

$$CH_3 - CH_2 - Br + 2[H] \xrightarrow{\text{Zn/dil. HCl}} CH_3 - CH_3 + HBr$$

(iii) Give the types of vitamins.

Ans Vitamins are divided into two types:

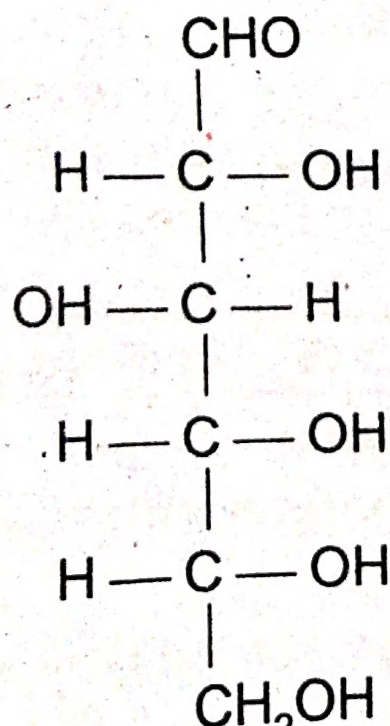
1. Fat-soluble vitamins, *i.e.*, A, D, E and K.
2. Water-soluble vitamins, *i.e.*, B complex and C.

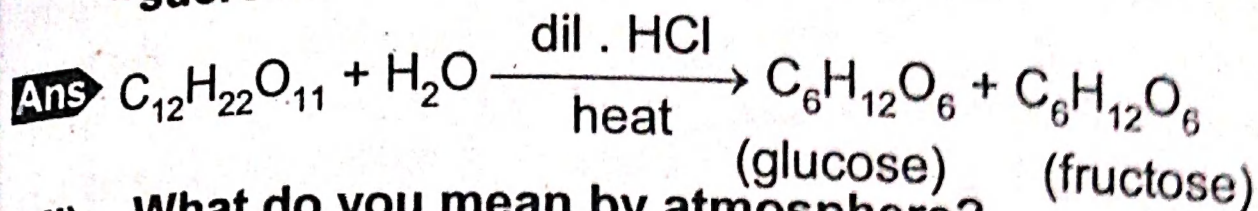
(iv) How are proteins formed?

Ans Amino acids are the building blocks of proteins. Two amino acids link through peptide linkage that is formed by the elimination of water molecule between the amino group of one amino acid and carboxyl group of another.

(v) Draw the structural formula of glucose.

Ans

```
        CHO
         |
    H — C — OH
         |
   OH — C — H
         |
    H — C — OH
         |
    H — C — OH
         |
       CH2OH
```

(vi) Give the balanced equation for the hydrolysis of sucrose.

Ans $$C_{12}H_{22}O_{11} + H_2O \xrightarrow[\text{heat}]{\text{dil . HCl}} \underset{\text{(glucose)}}{C_6H_{12}O_6} + \underset{\text{(fructose)}}{C_6H_{12}O_6}$$

(vii) What do you mean by atmosphere?

Ans Atmosphere is the envelope of different gases around the Earth. It extends continuously from the Earth's surface outwards without any boundary.

(viii) Give two effects of global warming.

Ans Due to global warming, there are great changes in the weather conditions. Moreover, it melts the glaciers and snow-caps that increase the flood risks and tropical cyclones.

(ix) How is acid rain produced?

Ans Acid rain is produced on dissolving acidic air pollutants such as sulphur dioxide and nitrogen dioxide by rain-water.

4. Write short answers to any Five (5) questions: 10

(i) Describe the difference between temporary and permanent hardness of water.

Ans Temporary hardness is because of biocarbonates of calcium and magnesium while permanent hardness is because of presence of sulphates and chlorides of calcium and magnesium.

(ii) Write two disadvantages of hard water.

Ans Following are the two disadvantages of hard water:

1. Hard water consumes large amount of soap in washing purposes.
2. Drinking hard water causes stomach disorders.

(iii) What are water-borne diseases of water?

Ans Diseases that spread because of drinking polluted water or eating food prepared with polluted water are called water-borne diseases.

(iv) **What is fluorosis?**

Ans The fluorosis is a disease caused by the consumption of excess fluoride. Fluorosis can cause bones and teeth damage.

(v) **What is difference between minerals and ores?**

Ans The solid natural materials found beneath the Earth's surface, which contain compounds of metals in the combined state along with earthly impurities, are called minerals.

Those minerals from which the metals are extracted commercially at a comparatively low cost with minimum effort are called ores of the metals.

Hence, all ores of the metals are minerals, but all minerals are not ores.

(vi) **Define metallurgy.**

Ans The process of extraction of metal in pure state on a large-scale from its ore by physical or chemical means is called as metallurgy.

(vii) **How ammoniacal brine is prepared?**

Ans Ammoniacal brine is prepared by dissolving ammonia gas in sodium chloride solution (brine).

(viii) **Write two advantages of Solvay's process.**

Ans Following are the two advantages of Solvay's process:

1. It is a cheap process as raw materials are available at very low prices.
2. Carbon dioxide and ammonia are recovered and reused.

(Part-II)

NOTE: Attempt any Three (3) questions.

Q.5.(a) Define law of mass action and derive the general expression for equilibrium constant for a general reaction. (4)

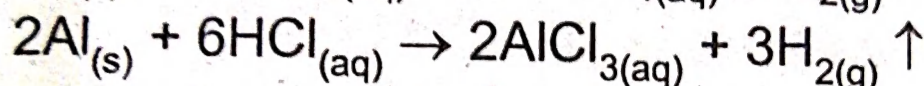
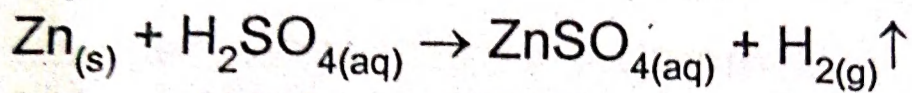
Ans For Answer see Paper 2015 (Group-I), Q.5.(a).

(b) **Write down the reaction of acids with metals, carbonates and bicarbonates.** **(3)**

Ans **1. Reaction with Metals:**

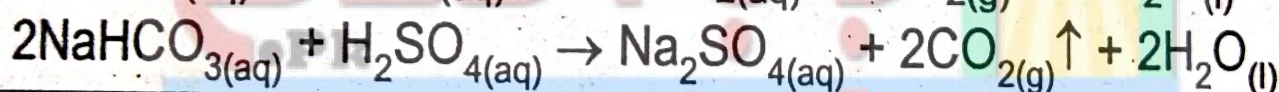
Acids react explosively with metals like sodium, potassium and calcium. However, dilute acids (HCl, H_2SO_4) react moderately with reactive metals like: Mg, Zn, Fe and Al to form their respective salts with the evolution of hydrogen gas.

$$Zn_{(s)} + H_2SO_{4(aq)} \rightarrow ZnSO_{4(aq)} + H_{2(g)}\uparrow$$

$$2Al_{(s)} + 6HCl_{(aq)} \rightarrow 2AlCl_{3(aq)} + 3H_{2(g)}\uparrow$$

2. Reaction with Carbonates and Bicarbonates:

Acids react with carbonates and bicarbonates to form corresponding salts with the evolution of carbon dioxide gas.

$$CaCO_{3(aq)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)}\uparrow + H_2O_{(l)}$$

$$2NaHCO_{3(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + 2CO_{2(g)}\uparrow + 2H_2O_{(l)}$$

Q.6.(a) Write down the composition and uses of different types of coal. **(4)**

Ans

Types of Coal	Carbon Contents	Uses
Peat	60%	It is inferior quality coal used in kiln.
Lignite	70%	It is soft coal used in thermal power stations.
Bituminous	80%	It is common variety of coal used as household coal.
Anthracite	90%	It is superior quality hard coal that is used in industry.

(b) Write down any three physical properties of alkenes. **(3)**

Ans Following are the three physical properties of alkenes:

1. The first member of the alkenes is ethene. It is a colourless gas with pleasant odour.
2. Alkenes are nonpolar, therefore, they are insoluble in water but soluble in organic solvents.
3. The first member of the series, ethene, is slightly less dense than air.

Q.7.(a) Describe four uses of carbohydrates. **(4)**

Ans Following are the four uses of carbohydrates:

1. Carbohydrates regulate the amount of sugar level in our body. Low sugar level in body results in hypoglycemia.
2. Carbohydrates provide essential nutrients for bacteria in intestinal tract that helps in digestion.
3. Dietary fibre helps to keep the bowl functioning properly.
4. Carbohydrates protect our muscles from cramping.

(b) Describe any three effects of "Global Warming". **(3)**

Ans Following are the three effects of Global Warming:

1. Accumulation of carbon dioxide in air is resulting in increasing atmospheric temperature about 0.05°C every year.
2. It is causing major changes in weather patterns. Extreme weather events are occurring more commonly and intensely than previously.

3. It melts glaciers and snow-caps that are increasing flood risks and intense tropical cyclones.

Q.8.(a) Write down the methods to remove the permanent hardness of water. (4)

Ans Removal of Permanent Hardness:

Permanent hardness can only be removed by using chemicals. Calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions are removed as insoluble salts by adding washing soda (Na_2CO_3) or sodium zeolite.

1. By Using Washing Soda:

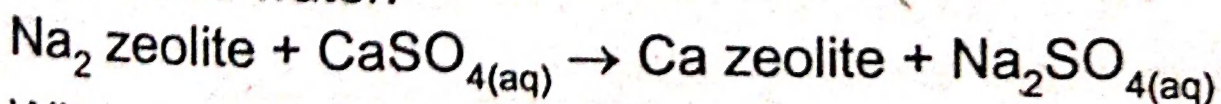
The addition of washing soda removes the calcium and magnesium ions as the insoluble calcium and magnesium carbonates, respectively.

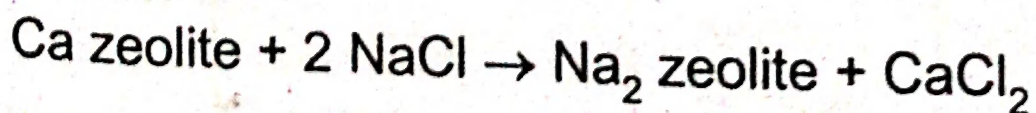
$$Na_2CO_{3(aq)} + CaSO_{4(aq)} \rightarrow CaCO_{3(s)} + Na_2SO_{4(aq)}$$

$$Na_2CO_{3(aq)} + MgSO_{4(aq)} \rightarrow MgCO_{3(s)} + Na_2SO_{4(aq)}$$

2. By Using Sodium Zeolite:

Sodium zeolite is a naturally occurring resin of sodium aluminium silicate Na $Al(SiO_3)_2$, which can also be prepared artificially. It is used for softening of water at domestic as well as on industrial scale. When water is passed through resin, sodium ions of the resin are exchanged with the unwanted calcium and magnesium ions of the hard water.

$$Na_2 \text{ zeolite} + CaSO_{4(aq)} \rightarrow Ca \text{ zeolite} + Na_2SO_{4(aq)}$$

When resin is fully used up, it can be regenerated by flushing it with concentrated solution of NaCl. The reverse process takes place because of high concentration of sodium ions.

$$Ca \text{ zeolite} + 2\,NaCl \rightarrow Na_2 \text{ zeolite} + CaCl_2$$

(b) Describe the importance of urea. (3)

Ans For Answer see Paper 2015, (Group-I), Q.9.(a).

Q.9.(a) Write a note on fractional distillation of petroleum. (4)

Ans The crude oil is refined in the refineries. Refining process is the process in the separation of crude oil mixture into various useful products. It is carried out by a process called fractional distillation. The principle of fractional distillation is based upon separation of substances depending upon their boiling points. The substances having low boiling points boil out first, leaving behind others. Then next fraction of slightly higher boiling point boils out. This process remains continue until a residue is left behind. The vapours of each fraction are collected and condensed separately.

(b) Describe composition of atmosphere. (3)

Ans Atmosphere is the envelope of different gases around the earth. It extends continuously from the Earth's surface outwards without any boundary. About 99% of atmospheric mass lies within 30 kilometres of the surface and 75% lies within the lowest 11 kilometres.

Percentage composition of atmosphere by volume is shown in the following table:

Gas	% by Volume
Nitrogen	78.09
Oxygen	20.94
Argon	0.93
Carbon dioxide	0.03

(Practical Part)

Note: Attempt any TWO (2) questions.

A-(i) Write the apparatus required to standardize hydrochloric acid solution. (3)

Ans Pipette, burette, funnel, conical flask, beaker.

(ii) Write the procedure of experiment to find molarity of sodium hydroxide solution by volumetric analysis. (2)

Ans **Materials:**

Beakers, burette, pipette, funnel, conical flask, iron stand. Distilled water, 0.1 M HCl solution, NaOH solution, phenolphthalein.

Procedure:

1. Rinse the pipette first with distilled water and then with the given NaOH solution.
2. Rinse the conical flask with distilled water only.
3. Pipette out 10 cm^3 of NaOH solution into a conical flask.
4. Add one to two drops of phenolphthalein indicator into it. The solution turns pink.
5. Rinse the burette first with distilled water and then with the given HCl solution.
6. Fix the burette on a clamp stand in an upright position.
7. Fill it with the given HCl solution with the help of a funnel. Remove funnel from the burette.
8. Using the tap at the base of the burette, allow the acid to flow into a beaker to remove any air bubble present in the nozzle.

9. Note the burette reading as an initial reading using an anti-parallax card or a white paper.

10. Carry out a rough titration by adding hydrochloric acid solution from the burette in approximately 1 cm^3 portion to the conical flask.

11. The contents of the flask must be swirled after each addition of acid for thorough mixing.

12. Keep on adding acid till the colour of solution becomes light pink and then check whether this pink colour disappears by adding one more drop of the acid.

13. This will be the end point of the reaction.

14. Again note down the burette reading, this will be the final reading.

15. The difference of final and initial readings of burette will give the volume of the acid used.

16. Repeat the titration for accurate reading. For this purpose, add hydrochloric acid solution from the burette to the conical flask rapidly to within 2 cm^3 of the end point and then add drop by drop till the end point is reached.

17. Take three concordant readings which agree with one another within 0.1 cm^3.

B-(i) Write apparatus for the experiment to identify things as acidic, basic or neutral. (2)

Ans **Apparatus:** Six 100 cm^3 beakers, red and blue litmus papers, safety goggles, test tubes.

(ii) Give procedure to identify ketones by 2,4-dinitrophenyl hydrazine test. (3)

Ans For Answer see Paper 2016 (Group-I), Q.B.(ii).

C-(i) Write the apparatus required to identify phenol by ferric chloride test. (2)

Ans **Material Required:**

Test tubes, test tube holder, test tube rack, dropper, safety goggles, phenol solution, freshly prepared ferric chloride solution and distilled water.

(ii) Write the procedure for the experiment to identify saturated and unsaturated hydrocarbons by $KMnO_4$ test. (3)

Ans For Answer see Paper 2015, (Group-I), Q.C.(i).